

What is claimed:

2. 1. A multi-point, one-piece seat belt to increase the survival chance in the event of an accident of a vehicle, train or an aeroplane or turbulence-related vibrations of an aeroplane, comprising

several belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which, equipped with a belt retractor (13), a clamping device and a D-ring (12), is arranged to a vehicle body generally representing a post section, vehicle-, train- or an aeroplane body or a floor (6);

10 a buckle assembly (9.1) arranged to the floor (6) generally representing a vehicle-, train- or an aeroplane floor or a side rail of the vehicle;

at least two latch plates (2, 9, 11, 25) and

a belt deflector (17), which is arranged to the floor (6), to deflect and loosely guide the belt portions (1.1, 1.3);

wherein

15 the lower part of body (96) is restrained by the lap belt portion (1.3) when the main latch plate (9) is plug-in connected to the buckle assembly (9.1) and

20 the upper part of body (95) is restrained by extending two shoulder belt portions (1.1, 1.2) crosswise in an X-shape when the shoulder latch plate (2), fastened to the other belt end (ER) of the first shoulder belt portion (1.1), is plug-in connected to a buckle assembly (4, 4b, 4c, 4e, 14, 14a, 18, 18a, 18b, 18.1 to 18.3) arranged to the side (SR) of a seat backrest.

2. A multi-point, one-piece seat belt to increase the survival chance in the event of an accident of a vehicle, train or an aeroplane or turbulence-related vibrations of an aeroplane, comprising

25 several belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which, equipped with a belt retractor (13), a clamping device and a D-ring (12), is arranged in one side (SL) of a seat backrest (3.2, 3.2a to 3.2d) and the other belt end (ER) is arranged in the other side (SR) thereof;

30 a buckle assembly (9.1) arranged to one side of a seat frame (3.3, 3.3a to 3.3d);

at least one latch plate (2, 9, 11, 25) and

a belt deflector (17), which is arranged to the other side of the seat frame, to deflect and loosely guide the belt portions (1.1, 1.3);

wherein

35 the lower part of body (96) is restrained by the lap belt portion (1.3) when the main latch plate (9) is plug-in connected to the buckle assembly (9.1) and

the upper part of body (95) is restrained by extending two shoulder belt portions (1.1, 1.2) crosswise in an X-shape when the first shoulder belt portion (1.1) is moved from the resting position to the operating position.

3. A multi-point, one-piece seat belt to increase the survival chance in the event of an accident of a vehicle, train or an aeroplane or turbulence-related vibrations of an aeroplane, comprising

several belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which, equipped with a D-ring (12), is arranged in one side (SL) of a seat backrest (3.2, 3.2a to 3.2d) and the other belt end (ER) is connected to a belt retractor (13) provided with a clamping device, arranged in the other side (SR) thereof;
a buckle assembly (9.1) arranged to a seat frame (3.3, 3.3a to 3.3d);
at least one latch plate (2, 9, 11, 25) and
a belt deflector (17), which is arranged to a floor (6), to deflect and loosely guide the belt portions (1.1, 1.3);

wherein

the lower part of body (96) is restrained by the lap belt portion (1.3) when the main latch plate (9) is plug-in connected to the buckle assembly (9.1) and
the upper part of body (95) is restrained by extending both shoulder belt portions (1.1, 1.2) crosswise in an X-shape when the first shoulder belt portion (1.1) is moved from the resting position to the operating position.

4. A multi-point, one-piece seat belt to increase the survival chance, whereby a belted passenger is protected from submarining, in the event of an accident of a vehicle, train or an aeroplane or turbulence-related vibrations of an aeroplane, comprising

several belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which, equipped with a belt retractor (13), a clamping device and a D-ring (12), is arranged to the vehicle body and the other belt end (ER) is arranged in one side (SR) of a seat backrest (3.2, 3.2a to 3.2d);

a buckle assembly (9.1) arranged to a seat frame (3.3, 3.3a to 3.3d);
at least two latch plates (2, 9, 11, 25), at least one (11, 25) of which is movable along the lap belt portion (1.3); and
a belt deflector (17), which is arranged to the seat frame, to deflect and loosely guide the belt portions (1.1, 1.3);

wherein

the lower part of body (96) is restrained by the lap belt portion (1.3) when the main latch plate (9) is plug-in connected to the buckle assembly (9.1) and
the upper part of body (95) is restrained by extending both shoulder belt portions (1.1, 1.2) crosswise in an X-shape to the operating position;

both thighs of the passenger are restrained by two belt portions (1.3R, 1.3L) resulted from a subdivision of the lap belt portion (1.3) upon the plug-in connection of the latch plate (11, 25) with an additional buckle assembly (7, 8, 8a) arranged in a seat cushion (3.1, 3.1a to 3.1d).

5. A multi-point, one-piece seat belt to increase the survival chance, whereby a belted passenger in sleeping position is protected from submarining, in the event of an accident of a vehicle, train or an aeroplane or turbulence-related vibrations of an aeroplane, comprising several belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which, equipped with a belt retractor (13), a clamping device and a D-ring (12), is arranged in one side (SL) of a seat backrest (3.2, 3.2a to 3.2d) and the other end (ER) is arranged in the other side (SR) thereof;
a buckle assembly (9.1) arranged to a floor (6);
at least two latch plates (2, 9, 11, 25), at least one (11, 25) of which is movable along the lap belt portion (1.3); and
a belt deflector (17), which is arranged to a seat frame (3.3, 3.3a to 3.3d), to deflect and loosely guide the belt portions (1.1, 1.3);

wherein

the lower part of body (96) is restrained by the lap belt portion (1.3) when the main latch plate (9) is plug-in connected to the buckle assembly (9.1) and the upper part of body (95) is restrained by extending two shoulder belt portions (1.1, 1.2) crosswise in an X-shape to the operating position;

when the passenger lies on the seat cushion and seat backrest, tilted back, his thighs are restrained by two belt portions (1.3R, 1.3L) resulted from a subdivision of the lap belt portion (1.3) upon the plug-in connection of the latch plate (11, 25) with an additional buckle assembly (8b, 8c) provided with a release button (84e) and a length-adjustable belt, which is attached to the seat frame.

6. A multi-point, one-piece seat belt according to claim 1, wherein a belt-feeding device (20a, 20b) consists of

a belt housing (20.4a) equipped with the shoulder latch plate (2) and connected to one end of an operating arm (20.2a), the other end of which is connected to a guide tube (20.1) pivotally attached in the seat backrest;

where the shoulder latch plate (2) of the first shoulder belt portion (1.1) is inserted into and connected to the buckle assembly (4, 14, 18) of the seat backrest by rotatable movement of the guide tube (20.1) upon plug-in connection of the main latch plate (9) with the buckle assembly (9.1).

7. A multi-point, one-piece seat belt according to claim 1, wherein a belt-feeding device (20a, 20b) consists of

a belt housing (20.4a) equipped with the shoulder latch plate (2) and connected to one end of an operating arm (20.2a), the other end of which is connected to

a guide tube (20.1) pivotally attached in a supporting tube (3.61) of the head rest (3.6a); where the shoulder latch plate (2) of the first shoulder belt portion (1.1) is inserted into and connected to the buckle assembly (4, 14, 18) of the seat backrest by rotatable movement of the guide tube (20.1) upon plug-in connection of the main latch plate (9) with the buckle assembly (9.1).

8. A multi-point, one-piece seat belt according to claim 2, wherein

the belt end (ER) of the first shoulder belt portion (1.1) is connected to the seat backrest frame (3.4, 3.4c, 3.4d); and

that shoulder belt portion (1.1) is moved from the resting position to the operating position by at least one feeding part (20.2, 20.4c, 20.4d) of a belt-feeding device (20, 20c, 20d).

9. A multi-point, one-piece seat belt according to claim 2, wherein the belt end (ER) of the first shoulder belt portion (1.1) is connected to a coupling member (1.2a, 1.2b) to receive energy absorbers; and that shoulder belt portion (1.1) is moved from the resting position to the operating position by at least one feeding part (20.2, 20.4c, 20.4d) of a belt-feeding device (20, 20c, 20d).

10. A multi-point, one-piece seat belt according to claim 3, wherein the belt retractor (13), moveably attached to a stiff plate (13.3) of the seat backrest frame, is provided with a coupling member (1.2a, 1.2b) to receive energy absorbers; the belt end (EL) is connected to energy absorbers; and the first shoulder belt portion (1.1) is moved from the resting position to the operating position by at least one feeding part (20.2, 20.4c, 20.4d) of a belt-feeding device (20, 20c, 20d).

11. A multi-point, one-piece seat belt according to claim 8, wherein the belt-feeding device (20c, 20d) serves as a rollover device, which is a member of the seat backrest frame (3.4d), along two rollover tubes (20.2b) of which the belt housing (20.4d), equipped with a safety bracket (20.6) with two legs movable therein, is movable, when the first shoulder belt portion (1.1) is in the operating position, the holes of the belt housing and of one of the rollover tubes (20.2b) are aligned with each other and in excess of a threshold value in the event of rollover both legs of the safety bracket protrude through the holes thereof, block the translatory movement of the belt housing and clamp the first shoulder belt portion (1.1).

12. A multi-point, one-piece seat belt according to claim 1, wherein the height- and width-adjusting mechanism (27) comprises a pair of tubes (27.1) of the seat backrest frame (3.4d) having a plurality of locking slots, one pair of which is engaged with a locking handle (27.5), that can be pulled to disengage therefrom and released to engage, when the height is adjusted; a frame (29) consisting of a pair of outer frame-tubes (27.2), movable along the inner frame-tubes (27.1), a connecting part of all frame-tubes (27.2, 27.3) and a pair of outer tubes (27.3), in which the inner tubes (27.4) are movable, biased by the springs (27.6) in cooperation with parts (27.7 to 27.9) and form- and force-locking connected to the locking handle (27.5); a plurality of locking slots arranged along one of the outer tubes (27.3); and at least one buckle assembly (18.3, 19.3), consisting of a buckle assembly (4c), to connect to the latch plate, and a housing (18.12), form-locking connected to the buckle assembly, movable along the outer tubes (27.3) and secured by a pawl (18.10) biased by a spring (18.5), engaged with the locking slot (r) and disengaged therefrom by pulling the pawl to adjust to the width of the seat backrest.

13. A multi-point, one-piece seat belt according to claim 1, wherein the height- and width-adjusting mechanism (27a) comprises
two pairs of tubes (27.1) of the seat backrest frame (3.4d) having a plurality of locking slots, two pairs of which are engaged with two locking parts (27.5, 27.10), coupled to each
5 other, disengaged therefrom by pulling the locking handle (27.5) and engaged therewith again upon release;
a frame (29a) consisting of a pair of outer frame-tubes (27.2), movable along the inner frame-tubes (27.1), a connecting part of all frame-tubes and a pair of outer tubes (27.3), in which the inner tubes (27.4) are movable, biased by the springs (27.6) in co-operation
10 with parts (27.7a, 27.8, 27.9a, 27.11) and form- and force-locking connected to the locking parts (27.5, 27.10);
a plurality of locking slots, arranged along one of the outer tubes (27.3); and
one pair of buckle assemblies (18.3, 19.3), each of which consists of a buckle assembly (4c), for the purpose of plug-in connection to the latch plate, and a housing (18.12), form-
15 locking connected thereto, movable along the outer tubes (27.3) and secured by a pawl (18.10) biased by a spring (18.5), engaged with the locking slot (r) and disengaged therefrom by pulling the pawl to adjust to the width of the seat backrest.

14. A multi-point, one-piece seat belt according to claim 1, wherein the belt deflector (17) comprises a housing, having an attachment hole, and a pin (17.1), attached in the housing to
20 form an aperture.

15. A multi-point, one-piece seat belt according to claim 14, wherein the pin (17.1) is surrounded by a sleeve (17.2).

16. A multi-point, one-piece seat belt according to claim 14, wherein the shoulder latch plate (2) is loosely retained by the aperture of the belt deflector (17).

25 17. A multi-point, one-piece seat belt according to claim 14, wherein the belt deflector (17) is made of one piece.

18. A multi-point, one-piece seat belt according to claim 1, wherein the shoulder latch plate (2), easily accessed by the passenger when intending to use the belt, in the resting position is plug-in connected to a buckle assembly (16, 16a, 16b), which is arranged to the seat backrest
30 (3.2).

19. A multi-point, one-piece seat belt according to claim 1, wherein the shoulder latch plate (2), easily accessed by the passenger when intending to use the belt, in the resting position is plug-in connected to a buckle assembly (16, 16a, 16b), which is arranged to the post section.

35 20. A multi-point, one-piece seat belt according to claim 1, wherein the shoulder latch plate (2), easily accessed by the passenger when intending to use the belt, in the resting position is plug-in connected to a buckle assembly (16, 16a, 16b), which is arranged to the seat cushion (3.1).

21. A multi-point, one-piece seat belt according to claim 4, wherein the belt-feeding device (20, 20a to 20d) is operated by at least one electrical motor (20.5).

22. A multi-point, one-piece seat belt according to claim 21, wherein the rotatable movement of the operating arm (20.2) together with the shoulder belt portion (1.1) and the translatory movement of the belt housing (20.4d) are synchronized by the drive apparatus of the belt-feeding device (20d).

5 23. A multi-point, one-piece seat belt according to claim 21, wherein a belt housing (20.4a), having the shoulder latch plate (2), is adjustable in height by moving two openings, facing each other, along the operating arm (20.2a).

24. A multi-point, one-piece seat belt according to claim 23, wherein a radial-adjustable tube (20.3) is arranged to the guide tube (20.1) of the belt-feeding device (20a, 20b).

10 25. A multi-point, one-piece seat belt according to claim 23, wherein the height-adjustable belt housing (20.4a), having the shoulder latch plate (2), is arranged to the guide tube (20.1) of the belt-feeding device (20a, 20b).

15 26. A multi-point, one-piece seat belt according to claim 1, wherein the belt deflector (5b), located on the top edge of the seat backrest at the side (SL) thereof, is adjustable in height by moving a handle (5.2, 27.5).

27. A multi-point, one-piece seat belt according to claim 1, wherein the belt deflector (5a) is attached to the head rest (3.6a).

28. A multi-point, one-piece seat belt according to claim 21, wherein the belt-feeding device (20) comprises

20 the operating arm (20.2), to one end of which a belt ring (20.8) is rigidly attached to loosely guide the first shoulder belt portion (1.1) and to the other end of which a guide tube (20.1) is rigidly attached, where the guide tube (20.1), pivotally attached to the bearing casing (20.10) of the seat backrest frame, is rotated and countersunk in the seat backrest by a drive apparatus; and

25 a belt-feeding plate (20.9, 20.9a) to maintain the first shoulder belt portion (1.1) over the head rest (3.6) during the rotation and to receive the operating arm (20.2).

29. A multi-point, one-piece seat belt according to claim 28, wherein the belt-feeding device (20) in the resting or operating position is countersunk in the seat backrest.

30 30. A multi-point, one-piece seat belt according to claim 21, wherein the first shoulder belt portion (1.1) is moveable from the resting position to the operating position by activating the drive apparatus of the belt-feeding device (20, 20a to 20d) in response to actuating a switch, where the drive apparatus is switched off when the operating position is reached.

35 31. A multi-point, one-piece seat belt according to claim 21, wherein the first shoulder belt portion (1.1) is moveable from the resting position to the operating position by activating the drive apparatus of the belt-feeding device (20, 20a to 20d) in response to pressing x-times the master release button (84) of the buckle assembly (9.1), where the drive apparatus is switched off when the operating position is reached.

40 32. A multi-point, one-piece seat belt according to claim 21, wherein the first shoulder belt portion (1.1) is moveable from the resting position to the operating position by activating the drive apparatus of the belt-feeding device (20, 20a to 20d) in response to activating a switch, attached in the buckle assembly (9.1), upon contact with a cam of the main latch plate (9), when inserted therein, where the drive apparatus is switched off when the operating position is reached.

33. A multi-point, one-piece seat belt according to claim 21, wherein the first shoulder belt portion (1.1) is moveable from the resting position to the operating position by activating the drive apparatus of the belt-feeding device (20, 20a to 20d) in response to starting an engine, where the drive apparatus is switched off when the operating position is reached.

5 34. A multi-point, one-piece seat belt according to claim 21, wherein the first shoulder belt portion (1.1) is moveable from the resting position to the operating position by activating the drive apparatus of the belt-feeding device (20, 20a to 20d) when the passenger closes a vehicle door, where the drive apparatus is switched off when the operating position is reached.

10 35. A multi-point, one-piece seat belt according to claim 21, wherein the first shoulder belt portion (1.1) is moveable from the resting position to the operating position by activating the drive apparatus of the belt-feeding device (20, 20a to 20d) when the passenger takes his seat, whereto a pressure sensor is built, where the drive apparatus is switched off when the operating position is reached.

15 36. A multi-point, one-piece seat belt according to claim 21, wherein the drive apparatus is operable to return the first shoulder belt portion (1.1) from the operating position to the resting position, when a dwell time, predetermined for the insertion of the shoulder latch plate (2) into the buckle assembly (4, 4a to 4c, 14, 14a, 18), is exceeded.

20 37. A multi-point, one-piece seat belt according to claim 4, wherein upon the pressure on the master release button (84) of the buckle assembly (9.1) an electrical motor (4.2b) pulls the release button (84b) of the buckle assembly (4b) to disengage the latch plate.

38. A multi-point, one-piece seat belt according to claim 37, wherein on depressing the master release button (84) all the latch plates (2, 9, 11, 25) are disengaged from the buckle assemblies of the seat.

25 39. A multi-point, one-piece seat belt according to claim 21, wherein on depressing the master release button (84) the drive apparatus of the belt-feeding device (20, 20a to 20d) returns the first shoulder belt portion (1.1) from the operating position to the resting position and all the latch plates (2, 9, 11, 25) are disengaged from the buckle assemblies of the seat.

30 40. A multi-point, one-piece seat belt according to claim 4, wherein upon the pressure on a release button (84a), arranged to the seat cushion, a release cable (4.2) pulls the release button (84a) of the buckle assembly (4a, 7, 8, 8a) of the seat cushion to disengage the latch plate of the lap belt portion.

35 41. A multi-point, one-piece seat belt according to claim 4, further comprising a belt-catching element (20.7, 20.7a), attached to the seat backrest, to intercept the first shoulder belt portion (1.1) when in the resting position.